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AGRICULTURAL NEWS LETTER

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This publication gives information on new developments of interest to agriculture on laboratory and field investigations of the du Pont Company and its subsidiary companies.

In addition to reporting results of the investigations of the Company and its subsidiaries, published reports and direct contributions of investigators of agricultural experiment stations and other institutions are given dealing with the Company's products and other subjects of agricultural interest.

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EFFECTIVENESS OF ETHYL MERCURY PHOSPHATE SEED TREATMENT RESULTS FROM TWO SEPARATE AND DISTINCT KINDS OF ACTION

EDITOR'S NOTE:- We present here excerpts from an address by J. Hunter Gooding, Jr., of the Bayer-Semesan Company at a meeting of the Independent Hybrid Seed Corn Producers at Urbana, Illinois, on September 8.

One of the most encouraging indications in our business in recent years is the increase in the interest shown by the consumer in the problems of seed disinfection. Growers are asking more questions and more questions of a technical nature than they did ten or even five years ago. They are beginning to understand that seed treatment is economically important and that it is based on principles just as scientific, just as sound, and just as practical as the use of fertilizers, the inoculation of legume seeds, the feeding of cattle, and the spraying of fruit trees.

Volatile Disinfectant Retains Effectiveness

I should like to take a few minutes to discuss one or two of the questions which have recently been raised. First, there is the question as to how New Improved "Semesan Jr.", being volatile or vapor-forming, can retain its effectiveness during long storage periods. This is a very natural question because if one knows only that ethyl mercury phosphate volatilizes to form a vapor, but knows nothing more than that about its behavior, then it is logical to wonder how it can retain its effectiveness during long storage periods. Let me say at the beginning that tests by ourselves and others have established beyond a doubt the fact that Junior, even though volatile, does retain its effectiveness on the seed almost indefinitely. The explanation is simple. When the product is applied to seed corn and the treated seed exposed to the air either in a bin, a sack or in the soil, two - not one - two different sorts of action take place - (1) volatilization and (2) adsorption. A portion of the ethyl mercury phosphate changes slowly from solid to vapor form or, in other words, forms a gas. At the same time another portion of the mercurial is taken up and bound by the seed coat. The chemist says it has been adsorbed on the surface of the seed. In this condition it cannot be separated from the seed coat by water in the form of drenching rains or by any other ordinary means. It thus remains almost indefinitely as an armor plate of disinfectant to protect the seed against decay organisms in the soil.

We could give you a product similar to the present New Improved "Semesan Jr." but less volatile or even non-volatile. The reason we don't is that it would be much less effective and hence less profitable to use. The change would not be to your advantage nor to the advantage of corn growers. Why? Because only a volatile or vapor-forming disinfectant can penetrate so effectively into every

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tiny crack and crevice on the surface of a grain of corn. To our eyes the surface of a kernel of corn appears to be quite regular and smooth, but it offers to the parasitic spores and germs, microscopic in size, a multitude of hiding places. Hidden in these tiny cracks in the seed coat and under the cap - wherever these parasites may be lurking - they can be reached best by a gas or vapor. It is to give you the utmost in seed disinfection, therefore, that Junior is designed to volatilize.

If there still be any question in your mind as to the advantage of volatility in a seed disinfectant, may I call your attention to the fact that New Improved "Ceresan", also volatile, has been almost universally adopted as a seed grain treatment in this country, and that 2% "Ceresan", another volatile disinfectant, is after 13 years of experiments and experience the only seed disinfectant recommended by authorities for the treatment of cotton seed.

Non-volatile Treatments Discarded

Years ago our company manufactured and sold non-volatile seed corn treatments. They were discarded because they and other experimental non-volatile compounds were found to be less effective in the laboratory and in the field than products like New Improved "Semesan Jr." We don't discard a good formula until we find a better one, and then, but not until then, do we make a change.

I wish to make it clear that New Improved "Semesan Jr." does not lose strength in the container. Even if the cover is not replaced, the loss in strength under ordinary conditions is so small as to be negligible. We have on hand samples of Junior made in 1934 and they are still just as good as the day they were made.

It will be seen from what has just been said that a product like New Improved "Semesan Jr." which does not volatilize to any appreciable extent until applied to the seed and then in its vapor phase is able to penetrate into every tiny crack and crevice on the surface of the seed has a distinct advantage over the non-volatile products which we discarded years ago.

While no essential change has been made in the formula for New Improved "Semesan Jr." since its introduction six years ago, we have changed the odor to that of pine and we have modified the physical properties so that there is now comparatively little flying dust during the treating operation.

Odor Provides Danger Signal

In passing, let me remind you that while workmen may object to odors in a seed disinfectant, the odor serves the very worth while purpose of warning them when they are inhaling too much of the powder. Remember, too, that odor or lack of odor has nothing to do with the poisonous properties of a chemical. A chemical with a vile odor may be practically harmless, while another with no odor at all may be very deadly. A rotten egg is anything but pleasant to our sense of smell but it is relatively harmless. Mercuric chloride, on the other hand, has no detectable odor, but inhaling more than small amounts of the pure salt would be a dangerous proceeding.

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Thus, it is not the odor, but the amount and nature of the chemical that counts. Containing only one percent ethyl mercury phosphate, New Improved "Semesan Jr." is relatively safe to use, although in common with all seed disinfectants it should be handled with common sense and due regard for the precautions prescribed for its use.

Factors Affecting Adherence of Disinfectant

The amount of Junior powder which will adhere to the seed differs somewhat with the size and type of kernel and the method of treating. It may vary from 1½ to 2 ounces per bushel of seed. Naturally a small rough kernel will hold more dust per bushel than a large smooth kernel. Sweet corn with its wrinkled kernels will take up more dust than field corn. Strictly speaking, probably the correct amount of Junior to apply is all that will stick to the seed.

If your treating equipment coats the seed uniformly with 1½ ounces of dust, that is sufficient. Applications of two or three times that much will give no improvement over the proper quantity, which of course would mean a wasting of the dust. In most seed treaters the powder feed continues to deliver disinfectant as long as the machine is operating and regardless of whether the seed hopper is empty or full. Hence if the machine is permitted to operate even for a few seconds with an empty seed hopper, the next batch of seed to be treated will receive a heavy overdosage of disinfectant. Even if this causes no injury to the seed, it gives the farmer a bad impression of the methods used by the seedsman and may cause trouble in his planter. To guard against the possibility of overtreating the seed, it should be run over a screen in a shallow layer before being sacked. This will remove and collect any excess dust, which may be used again.

In closing I wish to assure you that the scientific resources of our organization are at your service to assist in solving problems which you may encounter in your seed treating operations.

"Semesan Jr." and "Ceresan" are trade-marks
registered in the U. S. Patent Office by
Bayer-Semesan Company, Wilmington, Delaware.

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IMPROVED TYPES OF TITANIUM DIOXIDE PIGMENTS DEVELOPED FOR USE IN OUTSIDE HOUSE FINISHES

EDITOR'S NOTE:- This is an outline of a paper presented at the fall meeting of the American Chemical Society at Boston, Massachusetts.

By R. E. Troutman and W. G. Vannoy,
Krebs Pigment and Color Corporation,
Newport, Delaware.

The performance of outside house paints has been tested under a wide variety of conditions and the results widely reported in the literature. These have in general agreed in showing that the greater the degree of acceleration, the poorer the correlation with results under practical exposure conditions. Experience indicates that data from prolonged vertical exposures, supplemented by repeated tests on both test fences and test houses, are required before it is possible to obtain a reliable evaluation of any exterior paint.

In the construction of exterior house paints, there has been a gradual evolution activated by the constant desire of manufacturers to produce improved products having better durability and lower cost with greater consumer satisfaction. The evolution of these paints has been from lead-in-oil to lead-zinc paints, subsequently to lithopone exterior paints and finally to paints carrying titanium dioxide. Properly formulated titanium type paints under normal conditions of exposure give excellent durability and a clean white appearance. Ultimate failure is by slow chalking and erosion thus leaving an excellent surface for repaint work.

These advantages in appearance and durability coupled with markedly superior hiding power because of the high refractive index of this pigment are being more and more appreciated. This is indicated by the continually increasing demand for such pigments and the widespread popularity of the new self-cleaning white outside house paints.

Improved Types Developed

Until recently, however, the use of white titanium dioxide in tinted outside house paints involved danger of excessive chalking and fading. This difficulty has been recognized for a number of years during which time extensive research and development work has been done in order to solve this problem. As a result of these exhaustive investigations, white titanium dioxide pigments are now available with inherently slower chalking and greatly improved tint retention properties yet retaining, to a marked degree, the self-cleaning and excellent

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durability characteristics generally associated with titanium type pigments. These pigments are marketed under the trade names "Ti-Pure" Y-CR titanium dioxide and "Ti-Pure" O titanium dioxide.

"Ti-Pure" Y-CR is a commercially pure white titanium dioxide manufactured by a process which gives to it improved resistance to chalking during exterior exposure. It provides the paint manufacturer with an opportunity of obtaining slightly better gloss and gloss retention as well as fade resistance without sacrifices in color or hiding power. The special field for "Ti-Pure" Y-CR is enamels and lacquers both interior and exterior where it can be used to very definite advantages. The fade resistant characteristics of this pigment, however, are not marked in house paint. Accordingly, it is not generally recommended for use in exterior house paints. Minor improvements, however, in gloss, chalking, and fade resistance may be realized in outside house paints by the use of "Ti-Pure" Y-CR in place of the regular grades of titanium dioxide.

"Ti-Pure" O is a white pigment with a slightly yellow undertone. It is decidedly more chalk resistant than regular titanium dioxide and considerably more chalk resistant than "Ti-Pure" Y-CR. It provides the paint manufacturer with an opportunity of producing a single base paint for whites and a full line of tints, though it is recognized that in whites it does not yield the clear brilliant outstanding white of ordinary titanium dioxide. "Ti-Pure" O can be used throughout a wide range of percentages in exterior paint formulas, which gives considerable leeway in meeting hiding power and cost requirements. In preparing "Ti-Pure" O exterior paints sufficient cofumed 35% leaded zinc oxide should be incorporated to inhibit mildew. Generally 40 to 45% of cofumed 35% leaded zinc oxide has given adequate protection. Likewise, sufficient extender should be used to give the paint a satisfactory pigment volume. Under these conditions, paints will be produced which are decidedly better than lead-in-oil in hiding power, durability, tint retention, and cleanliness and markedly superior to lead-zinc paints in durability.

"Ti-Pure" is a trade-mark registered in the U. S. Patent Office by Krebs Pigment and Color Corporation, Wilmington, Delaware.

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HYDROCYANIC ACID GAS USED FOR FUMIGATING BOX CARS TO PREVENT INSECT INFESTATION OF CONTENTS ENROUTE

EDITOR'S NOTE:- Experience indicates that losses due to insect infestation of agricultural products during shipment can be avoided by the fumigation method described here, in which "Cyanegg" sodium cyanide is used.

During the past two or three years much has been accomplished in the hydrocyanic acid gas fumigation of box cars loaded with commodities, and empty box cars for delivery to flour mills. While the fumigation of box cars has been practiced to some extent for many years by various methods with more or less success, the introduction of an efficient type of portable cyanide generator has made possible the development of a technique which provides greater assurance of successful fumigation.

At present, in California, a state quarantine requires the fumigation of all box cars in which cotton, cotton seed and cotton linters have been shipped from areas infested with destructive cotton insects and which are not present in California. The cyanide generator is employed for these fumigations in many cases.

New Generator Offers Important Advantages

The generator is specifically designed for the production of hydrocyanic acid gas from sodium cyanide. It is a simple piece of equipment in which the efficiency, economy and flexibility of the well-known and widely-used pot method of fumigation are retained.

Through the use of the cyanide generator it is now possible to carry out through fumigation from outside of a railroad car, a decided advantage in safety and economy. No pots or other equipment is necessary. Nobody has to be inside the car at any time during fumigation.

Box-car fumigation with the cyanide generator offers the following advantages over other methods:

1. "Cyanegg", the lowest-cost source of hydrocyanic gas, is employed.

2. Cars can be prepared and the doors closed and sealed, where necessary before applying the gas.

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3. Application of an instantly volatilized hot gas which is rapidly diffused to all parts of the car.

4. The work is performed with greater safety to operators because the entire fumigation operation is carried on from outside the car.

5. There is no clean-up work in the car, such as cleaning up and dumping residues, after the car has been opened for ventilation.

Fumigation of Foodstuffs Successful

Food products such as dried beans, rice and flour are being successfully fumigated with the cyanide generator. Commodities including cocoa beans, milled cereals and other products subject to insect infestation also may be fumigated.

The fumigation of box cars is especially valuable for the control of confused flour beetles, flour moths, weevil and other insects which may infest flour.

The miller who loads a car with insect-free flour naturally does not want his product to reach customers infested. The assurance that insect-free cars are used will eliminate an important source of such infestations and guard against subsequent complaints and the return of goods. Such returned goods are frequently dead losses to millers.

Agricultural authorities and others are invited to discuss fumigation problems with the R. & H. Department of E. I. du Pont de Nemours & Company, Wilmington, Delaware.

"Cyanegg" is a trade-mark registered in the U. S. Patent Office by E. I. du Pont de Nemours & Company, Wilmington, Delaware.

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SOME SANITARY MEASURES FOR THE FLOWER GARDENER TO EMPLOY IN THE FALL TO ASSIST IN THE PREVENTION OF PLANT DISEASES

EDITOR'S NOTE:- The information given here should be of value to the commercial grower, the home flower gardener and the home demonstration agent.

By Harry F. Dietz, Entomologist,
Du Pont Pest Control Research Laboratory,
Wilmington, Delaware.

Putting the Garden to Bed

When frosts have killed the garden annuals and the tender tops of most perennials and the leaves begin to rustle down, it is time to consider putting the garden to bed. This is not an operation that needs to be done immediately or in one day, but one that can be done systematically and gradually until winter comes. From the point of view of pest control, which includes not only insects and their allies but also diseases caused by fungi, bacteria and viruses, putting the garden to bed is primarily fall sanitation or cleanup.

Sanitation or cleanup in the fall is a highly beneficial and cultural practice that is an important supplement to, but not a replacement of, next year's pest control spray program. It is the removal and proper disposition of accumulated plant debris such as the dead annuals, the dead tops of herbaceous perennials, the weeds in and around the garden, the dead and diseased or insect-infested wood and fruits of woody ornamentals and the fallen leaves of ornamental shrubbery. The proper disposition of this plant debris is complete consumption by burning, but in many city or town gardens, due to fire regulations, this cannot be done. The other alternative is having it hauled away. Under no circumstances should this debris be used as a mulch or thrown into the compost pile. Reasons for destroying or otherwise disposing of garden debris are given here.

The space limitations in average gardens and perennial borders make effective and desirable rotation of crops impossible and necessitate the use of thoroughgoing sanitary measures, as well as fungicides and insecticides applied both to the plants and to the soil.

Organisms Survive the Winter

Many, if not most, of the common disease-producing organisms of the garden live over winter on infested plant parts or in the soil. Thus, if plant debris is left in the garden until next spring or is used as a mulch, an early and serious outbreak of diseases may be expected the following season if weather conditions

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are at all favorable. If the debris is thrown into the compost heap, any diseases occurring on it may thoroughly contaminate the compost and then be widely distributed throughout the garden when the compost is used. Such occurrence is particularly serious in the case of root rot fungi.

A few examples of common flower garden diseases surviving the winter on plant debris such as leaves, dead plants or tops of plants are as follows: the mildews of chrysanthemum, dahlia, delphinium, lilac, phlox, rose, zinnia and other annuals and perennials; the leaf spot and leaf blight diseases of hollyhock, iris, laurel, peony, phlox, rhododendron, rose and snapdragon.

Perhaps the most serious root rot disease is that of delphinium, an organism that does not restrict its attacks to this host, but may be equally serious on campanula, columbine, iris, penstemon, pyrethrum and a number of other perennials. It is a soil-borne organism and particular precaution should be taken to avoid distributing this disease through the garden.

Badly diseased plants should be removed along with the surrounding soil, provided this can readily be replaced with fresh soil. If such procedure is not possible, the soil surrounding the diseased plants should be thoroughly drenched with an organic mercury solution diluted according to the manufacturer's directions and proper precautions.

Careful Examination Necessary

After the leaves have fallen from woody ornamentals they should be carefully examined for disease lesions on both the wood and the fruit. Where disease is found, the wood or fruit should be removed and burned. This is particularly true of roses, lilacs, snowberry, rhododendrons and other shrubs.

Since the tops of gladiolus and dahlias will be killed by hard frost, these should be dug before there is danger of the ground freezing. With gladiolus in particular, careful examination should be made at digging time for the presence of one or more corm rots with which these plants may be affected. Badly diseased bulbs should be discarded and those that are saved should be dried as quickly and thoroughly as possible and cleaned from the old corms as soon as the drying has been completed.

Only those clumps of dahlia tubers should be selected for saving as have shown a very vigorous foliage, high flowering capacity and freedom from any stunting, because at least some forms of stunting are due to a mosaic or virus disease.

All plants with mottled, dwarfed or malformed foliage should be viewed with suspicion, whether this be among the gladiolus, lilies, peonies, or dahlias. In cases of doubt such plants should be removed from the garden as soon as these symptoms are noticed, because if all the trouble is a virus, it is apt to spread through all plants of the same kind in the entire garden. It is better to lose a few plants than to take chances with a virus disease.

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USEFUL DATA ON RATE OF PLANT FOOD ABSORPTION BY DIFFERENT CROPS AVAILABLE IN BOOKLET FORM

EDITOR'S NOTE: In previous issues of the "Agricultural News Letter," we have presented occasional reviews of experimental results with various crops showing the rate of plant food absorption by growing plants. The Ammonia Department of the du Pont Company has issued a new publication bringing these and additional data together in compact form. This booklet, entitled "The Rate of Plant Food Absorption and Its Relation to Fertilizers and Fertilizer Practice," will be sent upon request.

Studies of the rate of absorption of plant food by growing plants have been included among carefully controlled experiments with a variety of crops by agricultural experiment stations throughout the country. Four of these experiments are reviewed briefly in a new booklet recently issued by the du Pont Company (see Editor's Note above.) They include tomatoes, tobacco, potatoes, and corn, which give a fair cross-section of the rate of plant food absorption by the three important types of crops:

1. Tomatoes and tobacco are representative of late-planted crops with a short growing season.

2. Potatoes are normally planted very early and are a cool-weather crop that matures rapidly.

3. Corn is representative of spring-planted crops with a long growing season.

Low Absorption of Plant Food During Early Stages of Growth

The data, which are presented in the booklet by means of tables and diagrams, show that growing plants absorb very little of their plant food requirements during the early stages of growth. Heaviest absorption usually comes during mid-season and shortly thereafter, tapering off toward the latter part of the growing period previous to harvest.

Fertilizer Should Be Resistant to Leaching

These facts regarding the rate of absorption are of especial interest when considered in relation to fertilizers and fertilizer practice. Since the crops utilize very little plant food during early stages of growth, the fertilizer applied at or before planting is subject to the leaching action of heavy rains. Phosphorus and potassium do not ordinarily leach because they are chemically

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fixed by the soil. The amount of available nitrogen subject to loss by leaching may be greatly reduced by using a completely-available, leaching-resistant form, or forms, of nitrogen in the fertilizer.

Urea and Ammonia Forms of Nitrogen Meet the Requirements

The booklet points out that urea and ammonia forms of nitrogen meet the requirements, and presents experimental data covering these points. Urea and ammonia forms of nitrogen are completely available to the plant. That they are also highly resistant to leaching has been shown in a number of carefully controlled experiments in Maine, Connecticut, Georgia, Florida, and other states. Available data indicate that when urea is applied in the spring, as for potatoes, nitrate formation is slow for a period of four to eight weeks. When applied later in the spring, as for tomatoes and tobacco, nitrification of urea and ammonia nitrogen is relatively slow, and danger of leaching is minimized for two to five weeks. The conversion of ammonia to nitrate is, therefore, normally slow enough to prevent serious loss by leaching until such time as the crop is utilizing considerable quantities of nitrogen.

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A NEW MOTION PICTURE ON SEED DISINFECTION

The Bayer-Semesan Company, Wilmington, Del., announces the release of a new one-reel motion picture entitled "Black Scourge."

It presents a dramatic story in which the heroes are the American farmer and the American chemist. The picture, "shot" on a dozen typical farms and in experiment stations of the government and the Bayer-Semesan Company, features such "villains" as the stinking smut of wheat, the smut of oats and rye, the stripe disease of barley and the scourge of corn. Against these are arrayed the guardians of the Nation's "bread basket" -- American farmers -- using the weapons that science has provided to combat the scourge of the grain fields.